Section 3.4 - Predictions & Lines: y = mx + b

Curriculum Outcomes	Related Activities	Page in Text
• determine the slope and y-intercept of a line from a table of values	• an investigation explores the connection between the values of m and b in an equation, the graph of the equation, and the original situation	118
• determine the equation of a line using the slope and y-intercept	• a Focus shows the connection between the graph, equation, and the m and b and demonstrates how slope can be found and why it is important	117
• rearrange equations	• students solve problems using the skills they have learned with writing equations in the form y = mx + b • students investigate how to find equations of straight lines from limited information and use the equations to solve problems	122 126
• graph by constructing a table of values, by using graphing technology, and when appropriate by intercept-slope method	• students rearrange equations and formulas in order to graph the equation of enter formulas into a spreadsheet.	128

Oct 29-7:41 PM

- The equations we have been dealing with are linear equations or equations of lines.

- Equations of lines can be written in y = mx + b format or slope y-intercept form which is also known as standard form.

- To be able to determine the equation of a line we need 2 things: 1. a slope
  2. a point on the line

Oct 29-7:47 PM

SLOPE:

- the steepness of a line
- in equation form it is the coefficient of the variable x.
- in the format y = mx + b m = slope

Oct 29-8:12 PM

Types of Slopes:

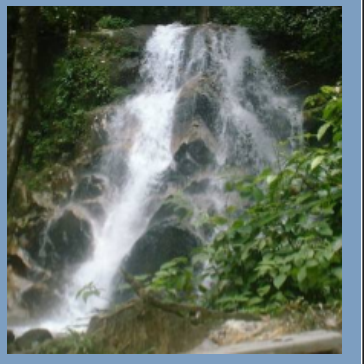
Slope

Positive

Negative

Undefined

Zero



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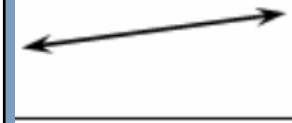
Steepness of Slopes:

Examples of Slopes for Steepness			
			
Not Steep	A Little Steeper	Even Steeper	Very Steep
Slope = 0.1	Slope = 1	Slope = 2	Slope = 4

Small slope **Large slope**

Oct 29-8:26 PM

How to Find Slope:

1. From the equation $y = mx + b$

the number found where the "m" is

Examples:

1. $y = -2x + 3$

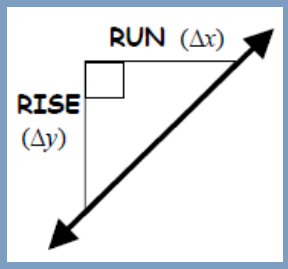
$m = -2$

2. $y = \frac{1}{3}x - 2$

$m = \frac{1}{3}$

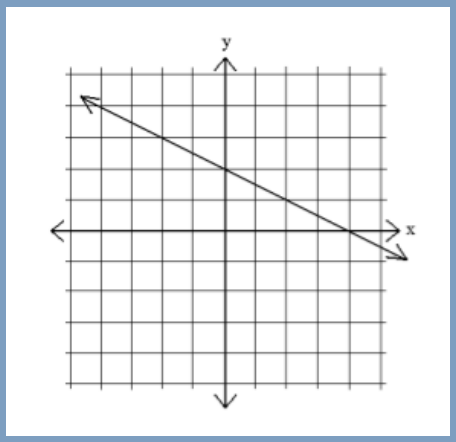
Oct 29-8:24 PM

2 From a graph using $\frac{\text{rise}}{\text{run}}$

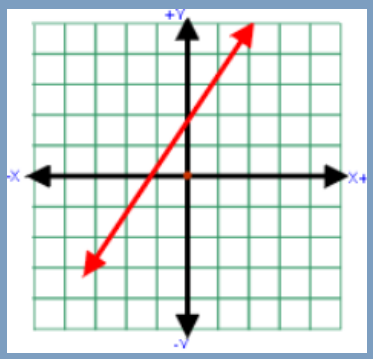


Examples:

1.



2.



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3 From 2 co-ordinate points

$m = \frac{y_2 - y_1}{x_2 - x_1}$ → y being the 2nd number in a co-ordinate (x,y)

→ x being the 1st number in a co-ordinate (x,y)

Examples:

1. (2, 7) & (5,1)
   $x_1\ y_1$ $x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7}{5-2} = \frac{-6}{3} = -2$

2. (-2,5) & (-5, 5)

$\frac{5-5}{-5+2} = \frac{0}{-3}$

zero

undefined

$\frac{3}{0} =$

Oct 29-8:24 PM

Pg. 129 #2, 3) show work for #2

2.a. $(1,1)$ $(4,3)$ Take out

$\frac{3-1}{4-1} = \frac{2}{3}$ $m = \frac{2}{3}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

(2) e. $(5,3)$ $(7,3)$

slope $\frac{3-3}{5-7} = \frac{0}{-2}$ $m = 0$

(h) $(2,-3)$ $(0,4)$

$\frac{4--3}{0-2} = \frac{7}{-2}$ $m = -3.5$

(3) g. $(0.5,3)$ $(2,-3)$

$\frac{-3-3}{2-0.5} = \frac{-6}{1.5} = -4$ $m = -4$

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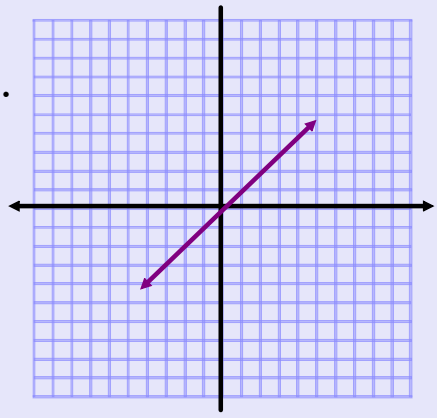
Practice:

State what the slope is for each of the following questions:

1. y = -2/3x +2

$m = -2/3$

2.



3. (1,4) (-8, -7)

$\frac{-7-4}{-8-1} =$

Nov 9-12:27 PM

Pg. 129 #2,3

Show your work for #2

For example:

#2a. $(1,1)$ $(4,3)$ x_1, y_1 x_2, y_2

$m = \frac{3-1}{4-1} = \frac{2}{3}$ $m = \frac{2}{3}$

slope (m) $m = \frac{y_2 - y_1}{x_2 - x_1}$

2.f. $(-3,4)$ $(5,-2)$ x_1, y_1 x_2, y_2

$\frac{-2-4}{5--3} = \frac{-6}{8}$ $m = \frac{-6}{8}$ $m = -0.75$

$\frac{4-02}{-3-5} = \frac{6}{-8}$ $m = \frac{-6}{8}$

g. $(-3,-1)$ $(-5,7)$

$\frac{-1-7}{-3--5} = \frac{-8}{+2}$ $m = -4$

3: $(2\frac{1}{5}, -3)$ $(-3\frac{1}{2}, \frac{1}{2})$

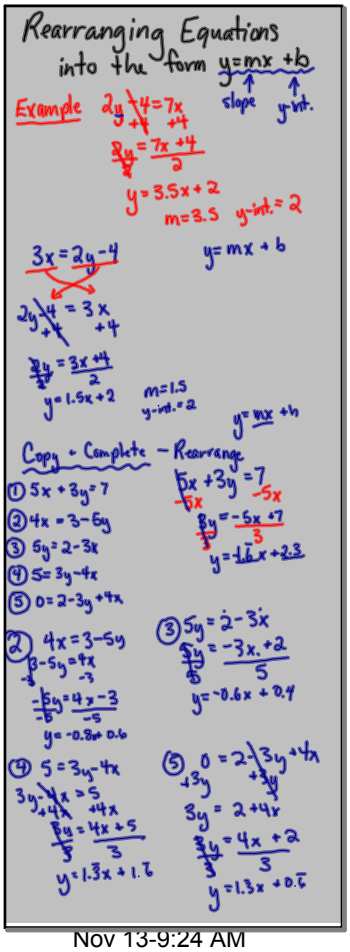
$(2.2, -3)$ $(-3.5, 0.5)$

x_1 y_1 x_2 y_2

$\frac{0.5--3}{-3.5-2.2} = \frac{3.5}{-5.7}$ $m = -0.61$

Nov 12-9:23 AM

Nov 13-9:09 AM



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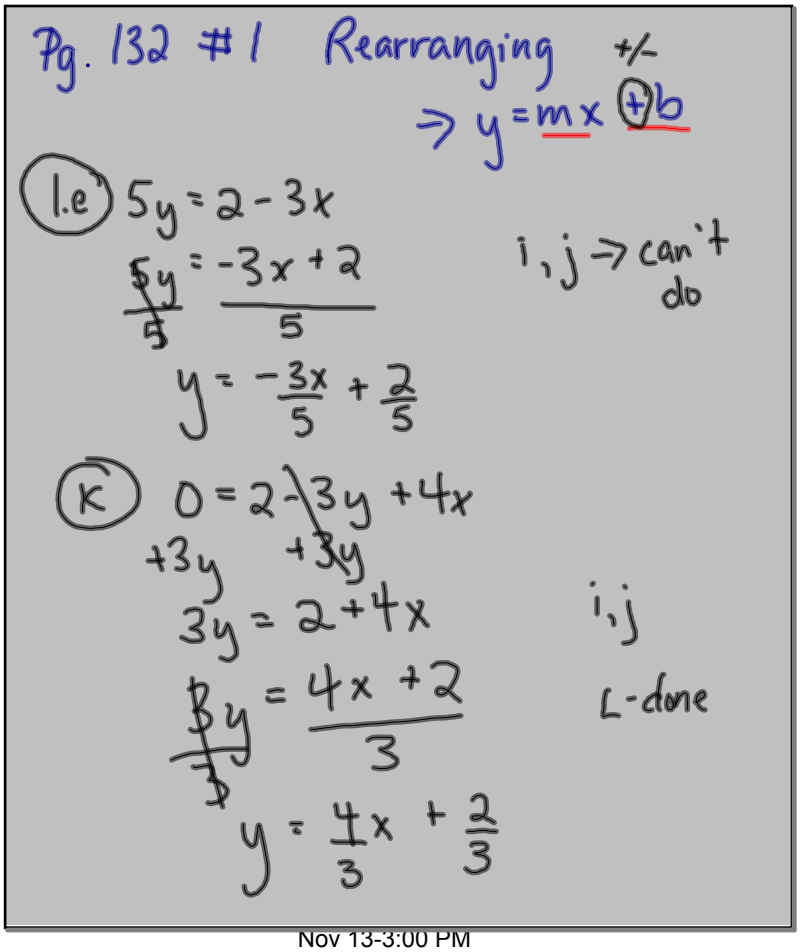

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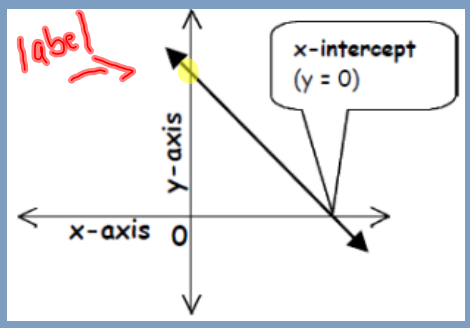
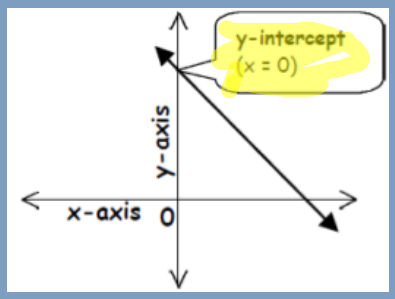
X and Y Intercepts:

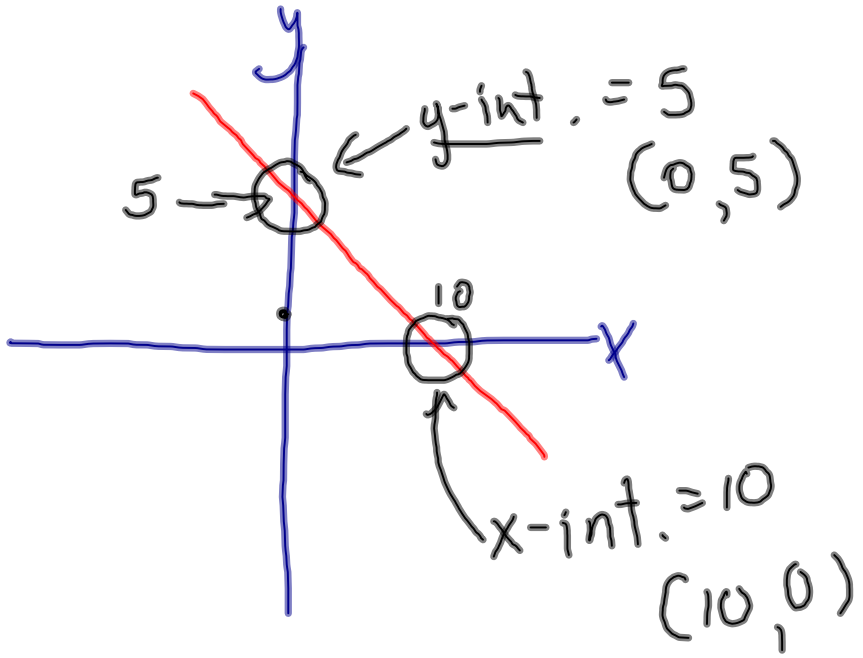
X-intercept= the point where a (line) graph crosses the x-axis;
the point where y = 0*

y-intercept= the point where a (line) graph crosses the y-axis;
the point where x = 0*





Nov 2-11:47 AM



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How to Find The X & Y Intercept:

Determine the x-intercept for $2x + y = 8$.

Solution:

Let $y = 0 \rightarrow \quad 2x + (0) = 8$

Solve for $x \rightarrow \quad 2x = 8$

$x = 4$

x-intercept is $\rightarrow$ 4 or (4, 0)

Determine the y-intercept for $2x + y = 8$.

Solution:

Let $x = 0 \rightarrow \quad 2(0) + y = 8$

Solve for $y \rightarrow \quad y = 8$

y-intercept is $\rightarrow$ 8 or (0, 8)

Nov 9-11:55 AM

Practice:

Find the x and y intercept for the following equations & write them in y=mx + b form and find the intercepts (x and Y):

Example:

1. $3x + y = 9$

$-3x \quad -3x$

$y = -3x + 9$ ① y-int.

slope $m = -3$

x-int: $y = 0$

$y = -3x + 9$

$0 = -3x + 9$ Solve for x

$-9 \quad -9$

$\frac{-9}{-3} = \frac{-3x}{-3}$ $x = 3$

(3, 0)

3. $3/4\ x + y = 8$

y-int. $x = 0$

$y = -3x + 9$

$y = -3(0) + 9$

$y = 0 + 9$

$y = 9$

(0, 9)

2. $5x + y = 20$

Example 2:

$5x + y = 20$

$-5x \quad -5x$

① Rearrange $y = -5x + 20$

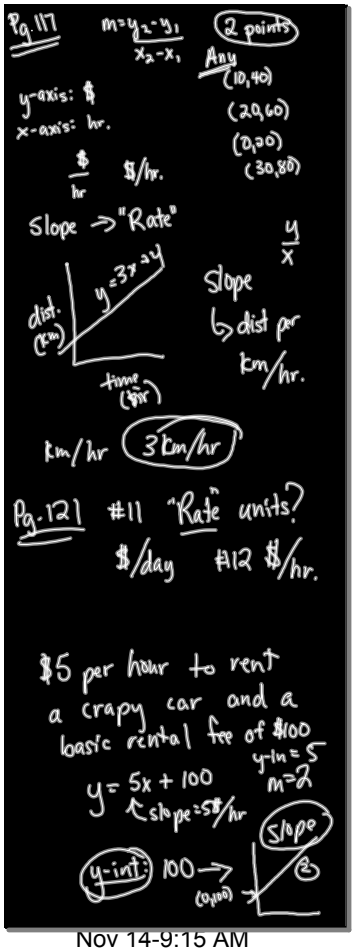
② x-int. $y = 0$ $0 = -5x + 20$ Solve for x

$-20 \quad -20$

$\frac{-20}{-5} = \frac{-5x}{-5}$ $x = 4$ (4, 0)

③ y-int $= 20$ (0, 20)

Nov 9-12:11 PM



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Pg. 117

- y-int. is 20
- slope (m) $m=\frac{y_2-y_1}{x_2-x_1}$ (10,40) (20,60)

$=\frac{60-40}{20-10}=\frac{20}{10}=2$

$m=2$

- Eqn. of the line: $y=mx+b$

5 hours of use:

$y=2(5)+20$

$y=10+20$

$y=30$

$y=2x+20$

$2/hr 20 fee

It costs $30 for 5 hrs. of use.

$y=\overset{\downarrow}{m}x+\overset{\downarrow}{b}$ $m=\frac{y_2-y_1}{x_2-x_1}$

"rate" means slope

"basic fee" means y-int.

Investigation 5 Pg. 118-119

Answer A, B, C

#1-4

Nov 14-9:31 AM

Attachments

Sec 3.4 - Slopes.doc

Sec 3.4 - Write the equation of a line (1).doc